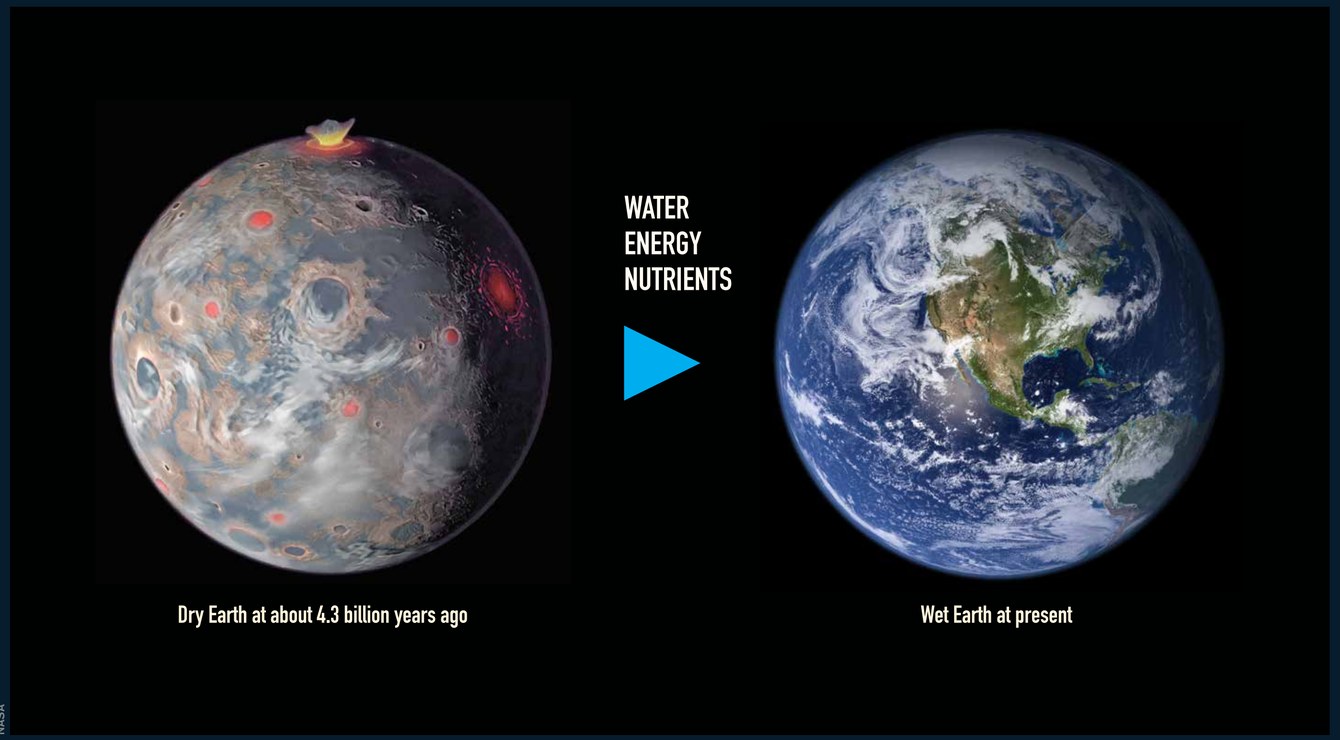
STATION 05 Building a Wet and Habitable Earth

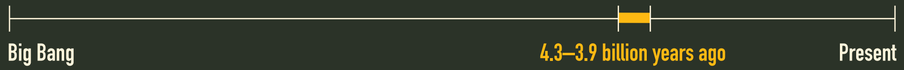


NASA

HOW DID THE OCEANS FORM? The Earth's surface cooled quickly after the Moon-forming event, forming a hot solid crust. Condensing water vapor from volcanoes, together with water and chemicals delivered by asteroids and comets, produced the first oceans, where life likely began.

Earth's oceans grew from small to global in scale in only 400 million years. Much of this water came from outer space, when migration of the giant planets scattered comets and asteroids throughout the Solar System in the Late Heavy Bombardment. These impactors brought water and organics (some of life's ingredients) to the early Earth.

EARLY EARTH
The icon above represents Earth during the Hadean period about 4.3 billion years ago. During this period, Earth had early oceans and dry continents with abundant old impact basins and fresh impact basins filled with lava.



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THE LATE HEAVY BOMBARDMENT: During this period, impacts on Earth created over 22,000 craters larger than 20 kilometers (km) in diameter, about 40 basins larger than 1,000 km, and several continent-sized basins larger than 5,000 km.

An ocean formed soon after the Moon-forming impact, but life first appeared 800 million years later (3.7 billion years ago), after the Late Heavy Bombardment.

Those impacts brought water and some of life's ingredients, and created hydrothermal systems on Earth that were excellent incubators for life.